CONDENSER SERVICE & ENGINEERING CO., INC.

HOBOKEN . . . NEW JERSEY

ENGINEERING
DESIGNING
MANUFACTURING
MAINTENANCE

A COMBINED SERVICE TO THE ENTIRE HEAT EXCHANGE FIELD

AFFILIATED COMPANIES

INSTRUMENT SERVICE CO., INC.
HOBOKEN, N.J.

BLACKBURN-SMITH MFG. CO., INC.
NEW YORK, N.Y.

This 3 POINT PROGRAM POSITIVELY REDUCTION OF ON CONDENSERS AND OTHER CLASSES

The CONDENSER SERVICE & ENGINEERING CO., INC. is saving thousands of dollars annually for users of tubular heat exchangers by rendering an inexpensive MAINTENANCE SERVICE that assures a profitable continuity of operation.

Guided by the knowledge acquired through wide experience, we have developed appliances that prolong tube life, as well as a sound and inexpensive method of testing tubes that, in most instances, obviates the expense of complete retubing.

Since proper maintenance results in economical operation, we offer this 3-point program with the assurance that it will pay substantial dividends in savings that accrue from increased tube life . . . improved operating efficiency . . . lower maintenance costs.

We have many customers in the Utility, Industrial, Oil Refinery and Marine fields . . . clients who exact the utmost in quality and speed of workmanship. It is significant that *they* are now the strongest advocates of our MAINTENANCE SERVICE. Their satisfaction is based on better performance and reduced maintenance costs.

1 AIR and EROSION ELIMINATOR

(Patented)

Removes the Cause ◆ Stops the Effect
Prevents Electrolysis Resists Dezincification
Stops Air Erosion

Air in the circulating water is conceded to be the chief cause of tube-end deterioration. Before the development of the AIR and EROSION ELIMINATOR no effective means of removing the air from the circulating water was available to the condenser operator.

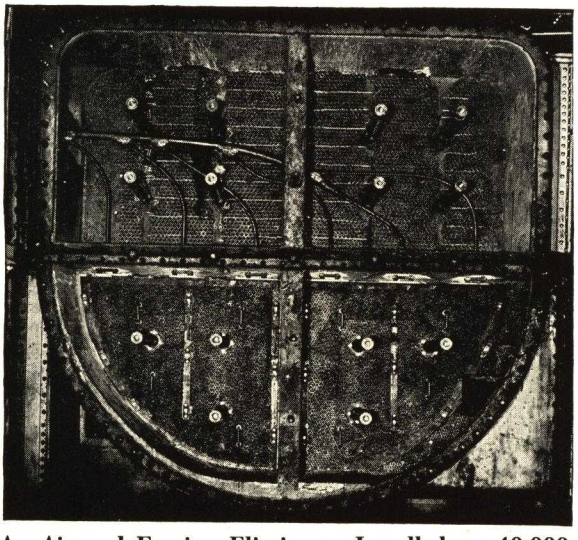
Now, however, this patented device eliminates that destructive element and, at the same time, stops electrolytic action and dezincification. It is not possible to state, at this time, exactly how much tube life is extended but there is one case where it has been *tripled after the tubes were condemned*, with no signs of failure to date. A number of cases exist where tube life has been doubled, also with no indication of failure. It will be some time before we know if tube life is continued indefinitely or if the average life is multiplied by 4 or 5.

We are constantly receiving repeat orders from users in widely diversified fields. One of the largest companies of its kind, starting with the installation of a single unit 3 years ago, subsequently installed 27 additional units. Further testimony as to the efficacy of the AIR and EROSION ELIMINATOR is to be found in the report made by a large public utility in an official document reading in part as follows:

"Difficulty was experienced due to the erosion or corrosion of tube-ends. The situation was quite serious and resulted in numerous tube losses." (Here a description of the AIR and EROSION ELIMINATOR previously installed is interpolated and the report continues:) "The result has been the complete elimination of all further corrosion or disintegration difficulties to date . . . an interval of 8 months."

It is interesting to note that since this report was made an additional period of 16 months has elapsed and so far there have been no tube failures of any kind.

Are not 2 years of additional trouble-free service from a set of condemned tubes sufficient testimony to justify the installation of the AIR and EROSION ELIMINATOR?



An Air and Erosion Eliminator Installed on 40,000 Sq. Ft. Surface Condenser

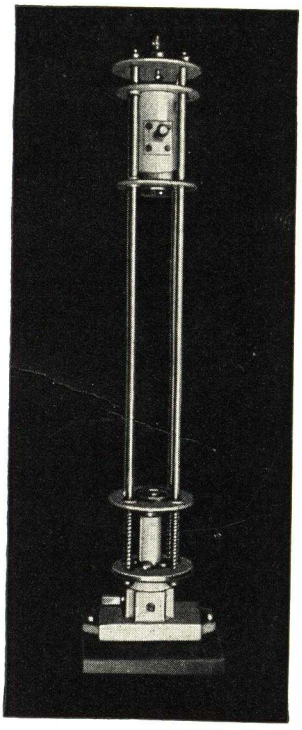
CONSTRUCTION AND OPERATION

A frame is built to fit the inlet water-box. To this frame a number of perforated plates, composed of a special metal, are fastened and the entire unit is installed in the water-box facing the tube sheet. All fastenings are of stainless steel or bronze. Entrained gases are liberated as the circulating water passes through the perforated plates. These gases accumulate above the surface of the water and are carried off by a series of nozzles leading through a manifold either to atmosphere or the discharge water leg. Instead of the tube-ends and tube sheet, the perforated plates (or deaeration screens) are attacked by the liberated gases and are gradually destroyed. *These plates are easily and quickly removed and replaced at very little expense.*

EVERY USER SATISFIED AND EVERY INSTALLATION SHOWING REMARKABLE SAVINGS

ASSURES MAINTENANCE COSTS OF HEAT EXCHANGE EQUIPMENT

MAXIMUM EFFICIENCY • ECONOMICAL PERFORMANCE



The Patented Hydro-Dynamic Shock Testing Machine

2 HYDRO-DYNAMIC SHOCK TESTING

(Patented)

A Startling Method of Tube Testing Which Is Saving Thousands of Dollars in the Maintenance of Tubular Heat Exchange Equipment

Years of intensive specialization have demonstrated to us that a relatively high percentage of tubes in heat exchangers are prematurely replaced.

The decision to retube is usually the result of an increasing number of service interruptions, and in the absence of an accurate method of testing, the operator has no alternative but to order a complete retubing job. This often results in tubes which have a substantially longer potential service life being discarded along with a relatively small percentage of defective tubes. This wasteful procedure is prevented by the HYDRO-DYNAMIC SHOCK TEST.

The SHOCK TEST is applied at accurately predetermined pressures to each tube, either in or out of place. Tubes that are about to fail in service are destroyed, and those capable of rendering further satisfactory service are salvaged. As a result, money and time are saved and service interruptions are minimized.

The importance of applying the HYDRO-DYNAMIC SHOCK TEST is not confined alone to old equipment. In a recent publication a large public utility recommended that it be applied to new tubes in order to prevent a class of failure which sometimes occurs shortly after retubing.

There is absolutely no reason now for premature retubing . . . consult with us and find the way to greater economies.

Substantial savings have been realized by the owners of all classes of heat exchangers who have availed themselves of this important service. References furnished on request.

3 "WIZARD" CONDENSER INJECTOR

(Patents Pending)

For Stopping Condenser Leaks Without Shutdown

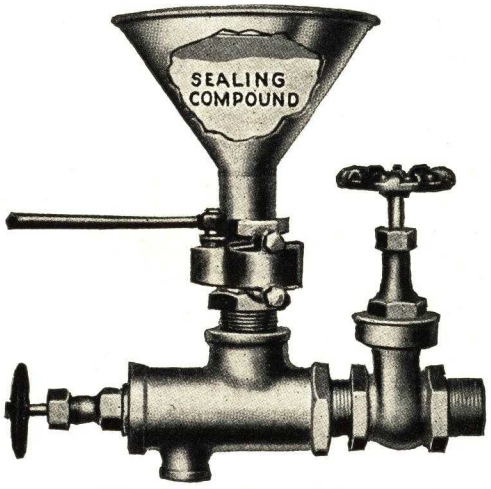
A practical, convenient and almost instantaneous method of stopping condenser tube leakage by injecting a dry sealing mixture into the circulating water. This mixture stops leaks. It is inexpensive and entirely harmless . . . it cannot damage or reduce the efficiency of the condenser in any respect.

The INJECTOR prevents the contamination of boiler feed water . . . reduces boiler maintenance . . . prevents service interruptions. Even where standby equipment is available time and money are saved, since the INJECTOR obviates the necessity of immediate shutdown, condensate dumping. and re-distribution of the load to other units.

The INJECTOR has no moving parts . . . it is simple in design and sturdily constructed for long service. An indication of its efficiency is the fact that one large operator, after trying one INJECTOR ordered nine more within five weeks after the first was installed.

The INJECTOR keeps your equipment operating when you want it most . . . it is, in short "the lowest priced boiler insurance on the market."

Write for a list of users.



"Wizard" Condenser Injector

INVESTIGATE THE SAVING POSSIBILITIES OF THIS PROGRAM ◆ ◆ NO OBLIGATION

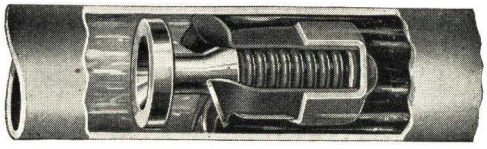
CONCO GUN and CLEANING PLUG

The Cleaning Plug Which Makes It Possible to Obtain That Last 1/10" of Vacuum

This is a most effective combination for keeping tubes clean. The CONCO GUN and CLEANING PLUG will do the job thoroughly . . . quickly . . . economically.

In operation, the CONCO *Turbine-type* CLEANING PLUG is shot through the tube by water at 100 to 200 lbs. per sq. in. pressure . . . without danger of cutting the tube. The blades are arranged to recede toward the center of the tube if too solid an obstruction is encountered on the tube sidewall. The plug is good for long service and is made of rustproof metal for 5/8, 3/4, 7/8 and 1-in. tubes . . . in 16, 17 and 18-gauges.

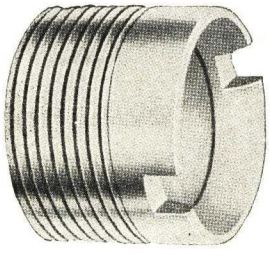
The CONCO GUN is specially designed to shoot the CONCO CLEANING PLUG and is adapted to any size cleaner by simply changing the nozzle.



Further information and a sample of the CONCO PLUG furnished on request.

FERRULES

Slotted Type



Slotless Type

We carry in stock for immediate delivery, in all standard sizes and threads, both the belled-mouth and square-shouldered ADMIRALTY MIXTURE SLOTTED FERRULES.

Operators will appreciate the advantages apparent in the smooth-flow SLOTLESS FERRULE. The slotless type prevents hydraulic disturbance at the entering edge and reduces the accumulation of debris characteristic of the slotted type. The SLOTLESS FERRULE is also furnished in all sizes, threads and materials. A special wrench is supplied for installing this type.

Regardless of how many ferrules you need or how quickly you need them we are always ready to render prompt and economical service.

Condenser plugs furnished to any specification.

"FLOWRITES"

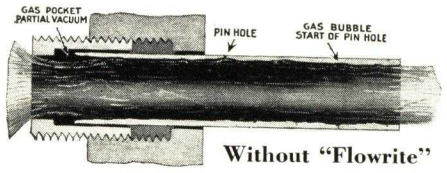
(Patented)

"The Perfect Water Inlet Nozzle for Condenser Tubes"

Save Condenser Tube Renewals by Eliminating Erosion at the Entrance Ends of Both New and Old Tubes

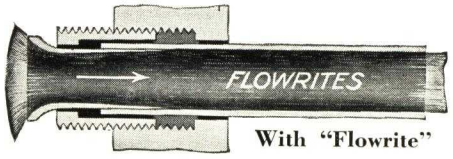
FLOWRITES are short belled-end tubes which are inserted in the water inlet end of condenser tubes. They prolong tube life by preventing sudden contraction of the water stream in the entering end, thus avoiding liberation of gases and the accompanying tube-end erosion. Smoothly directed flow, through the use of "FLOWRITES," insures minimum entrance friction and improved efficiency of the hydraulic circuit.

"FLOWRITES" are furnished in sizes to fit all standard sizes and thicknesses of tubes. They are comparatively inexpensive and easy to install.



Without "Flowrite"

Note how the pocket at the end of the tube collects gas, resulting in constant corrosive action and pinholes that quickly ruin the tube-end



With "Flowrite"

It will be observed that no pockets exist at the tube-end where corrosion can begin. *Note how the smoothly directed flow insures a water-filled tube.* The tube is protected while all wear takes place on the "FLOWRITES" which are easily replaced

TUBES

For Condensers and Other Heat Exchangers

We furnish tubes of all sizes and materials used in condensers and other classes of heat exchangers. In keeping with our rigid sales policy . . . *"Only the best materials the market affords"* . . . we handle tubes made by accredited manufacturers only. These tubes are furnished with the maker's Certificate of Analysis for your protection, and as tangible proof that our tubes meet the most exacting specifications.

The nature of our business places us in position to render exceptionally quick service on tube deliveries and installation. Whether your needs are large or small . . . *a few tubes or many* . . . your order will be carefully, promptly and accurately filled. All tubes shipped will conform exactly to your specifications. Where we perform the installation operation, we assume full responsibility for size, fit and packing tightness.

Whenever you need tubes . . . *write, telephone* or *wire.* Your order will be filled, without delay, at best market prices.

OUR REPUTATION IS BASED ON QUALITY MERCHANDISE AND FAST SERVICE

CONDENSER PACKING

We Carry a Complete Line of Corset Lace, Fibre and Metallic Packing

Each type of packing has been thoroughly tested in service and we believe each to be the best of its type available. Regardless of the type you select, you are assured of the utmost in economical and dependable performance.

Corset Lace Packing

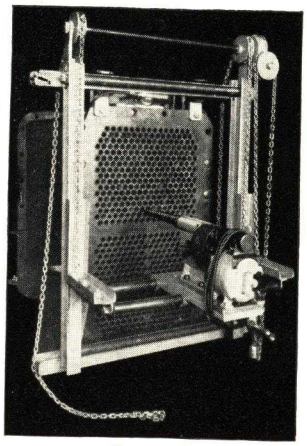
We carry in stock in all sizes from *No. 30* to *No. 96.*

You will be interested in our quick and efficient method of installing Corset Lace for permanent tightness.

The Modern Method of Installation with Patented Power Driven Tool

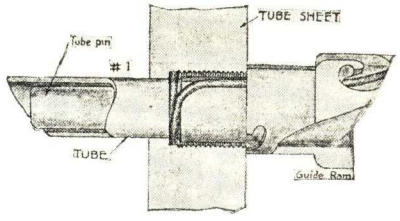
In our method of installation we use a special power-driven tool which inserts an oversize lace *(No. 72)* so firmly in place that it will remain intact, *without leakage*, for the life of the tube. The tight and uniform windings protect the inlet end so that after a long period of use it is frequently possible to remove the tube without damage . . . reverse it end-for-end . . . and thus obtain, at a very slight cost, a considerable extension of tube life.

The hand tool method of ramming in (not winding) a small size corset lace *(No. 30)* is not satisfactory. The use of a *No. 72* braid insures an absolutely tight gland when installed by our method because (a) there is no overlapping of braid; (b) no cutting of braid on threads; (c) the braid remains in one piece starting from bottom of stuffing box; (d) the braid is tightly wound, just fitting the box, giving the effect of a gland having been packed with correct sized packing; (e) the ferrule is not required to drive the packing home—it merely serves as a retainer and (f) the tube ends, therefore, cannot become damaged by undue tightening of ferrules.

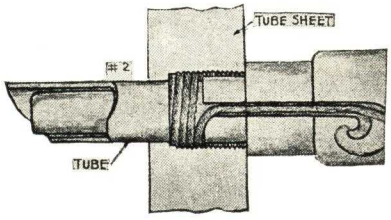


(Patented)
The Patented Power Driven Packing Tool

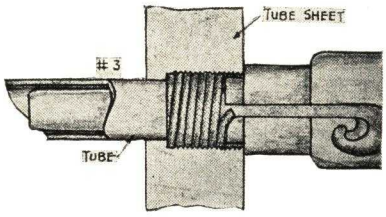
How the Braid Is Installed



Step No. 1



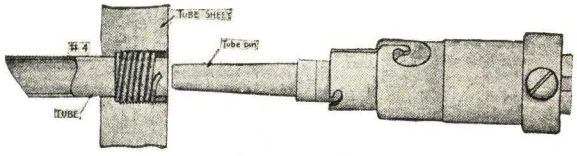
Step No. 2



Step No. 3

Step No. 1—A full turn of braid is taken around the tube pin and up through the outer sleeve.

Step No. 2—An inside sliding ram then drives the braid tightly against the bottom of the stuffing box.



Step No. 4

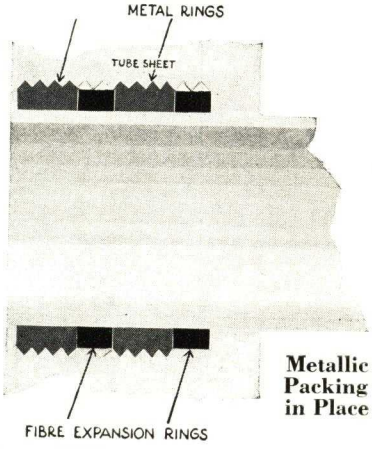
Step No. 3—By locking and revolving the tool (by hand, air or electricity) the braid is threaded in and wound tightly in the stuffing box to proper distance from the end of the box.

Step No. 4—The braid in place and the tool withdrawn.

Fibre Packing

We carry in stock a complete line of Fibre Packing in all standard sizes and thicknesses.

Regardless of the quantity you need, your order will receive our careful attention. We specialize in emergency orders.



Metallic Packing in Place

Metallic Packing

For use with or without ferrules.

Our "Metallic" is easy to install. It is also easy to remove . . . it comes out like a string . . . no sticking in the threads of the stuffing box.

All standard sizes carried in stock.

GET OUR PRICES BEFORE YOU BUY OR INSTALL PACKING

THE COMPANY
and the Scope of Its Activities

The CONDENSER SERVICE & ENGINEERING CO., INC., was organized primarily for the purpose of rendering a prompt and efficient Maintenance Service in the field of surface condenser and heat exchanger application. So varied and involved are the factors entering into the problem of tubular heat exchange maintenance, that the service of specialists, highly trained in the field of research peculiar to such apparatus, is essential in order that charges against this element of operating costs may be reduced to a minimum.

An organization so constituted and including, in addition, a staff of engineers with years of experience in every phase of condenser and heat exchanger *design*, *manufacture*, *maintenance* and *operation*, places the CONDENSER SERVICE & ENGINEERING CO., INC., in position to offer this invaluable service to users of all classes of heat exchange apparatus.

Although we specialize in maintenance, we have been called on to correct defects in design—defects which were not only troublesome but frequently the direct cause of failure in service. When we design (or re-design) the equipment, every phase of the operating and maintenance problem is taken into consideration and our procedure is governed by past experience.

With a view to further giving the Power Generating Industry and other users of condensers the benefits accruing to our complete designing service, maintenance service and manufacturing facilities, we are pleased to announce the addition of the latest and most modern of *High Vacuum Surface Condensers* to our line of manufacturing activities. Bulletins treating this subject will be issued shortly. In the meantime, inquiries will receive our prompt attention.

The service of our Engineering Staff is always available to assist in the solution of any Heat Exchange problem.

Consultation involves no obligation

The activities of
THE INSTRUMENT SERVICE CO., INC.
are described in detail on Page 9

OUR POLICY

Fast, accurate service . . . always dependable

◆

Only the finest materials the market affords

The products of
THE BLACKBURN-SMITH MFG. CO., INC.
are described and illustrated on Page 10

SERVICE

TESTING, CLEANING, RETUBING, REBUILDING

Surface Condensers
Oil Coolers and Heaters
Feed Water Heaters
Air Compressors-after-Coolers
Diesel Engine Inter-coolers
Stills
Oil Refinery Exchangers
Boilers
Heat Exchange Apparatus of all classes

DESIGNING, REBUILDING, MODERNIZING

Special heat transfer equipment designed to meet specific requirements. Old apparatus re-designed and modernized.

COMPLETE INSTRUMENT SERVICE

We repair and rebuild all makes and types of Industrial, Power Plant, Oil Refinery and Marine Instruments.

PRODUCTS

Surface Condensers
Heat Exchangers of all kinds
The Air and Erosion Eliminator
The "Wizard" Condenser Injector
The "Conco" Gun and Cleaning Plug
Ferrules—Slotted and Slotless Types
Condenser Plugs
"Flowrites"—The Perfect Entrance Nozzle for Condenser Tubes
Tubes for Condensers and other classes of Heat Exchangers
Packing—Corset Lace, Fibre, Metallic
Washers—Lead and Fibre
Support Sheets
Stays
Replacement Bundles
Cleaning Fluids
Maxwell Safety Valves—Stop, Check and Non-return Types. Also special valve for compressed gas and air cylinders
Gland Seal for Rotary Pumps
Salinometer Gauge or Try Cock
Special Universal Bevel Gear Drive for remote operation of signals or valves
Feed Water Filters
Grease Extractors
Strainers
Sewage Ejectors

TURN YOUR HEAT EXCHANGE WORRIES OVER TO US ◆ ◆ ◆ IT IS THE MOST

GENERAL MAINTENANCE SERVICE

The CONDENSER SERVICE & ENGINEERING CO., INC., specializes in a Maintenance Service that has resulted, in numerous instances, in saving operators 20% and more, of their average annual maintenance costs, notwithstanding the fact that these operators formerly had full maintenance crews of their own.

We are able to effect these economies through (1) the development of effective methods of eliminating the cause of heat exchanger troubles; (2) the exclusive use of specially perfected tools invented by our technicians (the pneumatic tube puller, the broken ferrule removing tool, the special packing tool, etc.) which greatly facilitate service operations, and (3) a capable engineering and working personnel trained exclusively and intensively in heat exchanger work and related activities.

Our operations extend through the Public Utility, Industrial, Refinery and Marine fields. The service is most complete, covering as it does engineering, designing, modernization, manufacturing and maintenance.

A FEW EXAMPLES OF OUR WORK

A large utility reported in a recent publication as follows:

"Recent operation of retubing a large unit was done by a condenser service contractor* using special tools for removing old tubes as well as for installing and repacking the new tubes. The work was expedited by the contractor and completed in approximately ⅓ of the time estimated as required by the regular plant maintenance force."

*This company

Our maintenance crews have retubed two condensers containing a total of 8800 tubes, including all necessary removals and replacements, in 71½ consecutive hours.

We have completely stripped and retubed, in 24 hours, an oil refinery bundle containing 500 1-in., 12-gauge steel tubes.

Many other instances of the calibre and speed of our Maintenance Service are available. References and details gladly furnished.

OUR SERVICE IS ALWAYS AVAILABLE

Any Time — 24 Hours a Day

Anywhere — 7 Days a Week

In Any Emergency — All Year Round

CLEANING FLUIDS

For Heat Exchange Equipment

We have developed effective materials for cleaning the steam and water sides of Condensers, Lubricating Oil Coolers and Fuel Oil Heater Coils in place.

Each of these materials we believe to be the best and most efficient of its kind now available and each is guaranteed to do a thorough job without injury to the metal.

The fluid for cleaning Lubricating Oil Coolers and Fuel Oil Heaters . . . circulating in place . . . is particularly effective and its use will result in marked fuel economies.

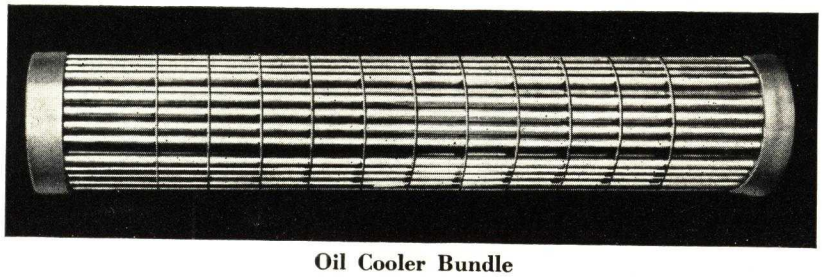
The cleaning operation may be performed by our own crews or the material will be furnished with full directions for its use.

Supplied in drums and ½-drums. Prices on application.

HEAT EXCHANGER BUNDLES

We carry on hand at all times all the material needed to furnish complete Heat Exchange Bundles of all kinds and sizes.

These bundles are supplied at extremely short notice and at unusually reasonable prices.



Oil Cooler Bundle

ECONOMICAL WAY TO PROFIT BY THE KNOWLEDGE AND EXPERIENCE OF SPECIALISTS

MAXWELL DOUBLE DISC VALVES

(Patented)

Safe in Operation — No Packing — Double Service
Permit Repair Under Pressure
For All Steam Pressures, Air, Gas or Any Liquid

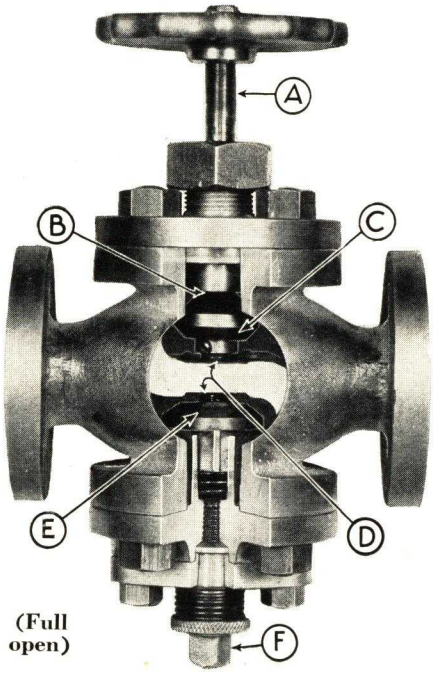
Maxwell Valves are efficient and reliable in service and exceptionally low in maintenance cost. They embody all the desirable features of the conventional type plus very definite advantages of design, construction and operation briefly enumerated below:

Safe in Operation—Maxwell Valves have no bridge. The closing strain is taken entirely by the valve discs and the seats . . . not by the valve chamber or cover.

No Packing—The elimination of packing results in lower maintenance costs and easier operation since spindle torque is reduced to a minimum.

Permit Repair Under Pressure—In case of damage to the upper part of the valve, the lower disc may be operated independently and locked in closed position permitting the repair or replacement of the upper units without shutting down pressure.

Sturdy Construction—Maxwell Valves are heavily constructed throughout for safety, durability and to insure trouble-free, dependable service. Valve discs are rigidly supported to prevent damage by vibration or wire-drawing.



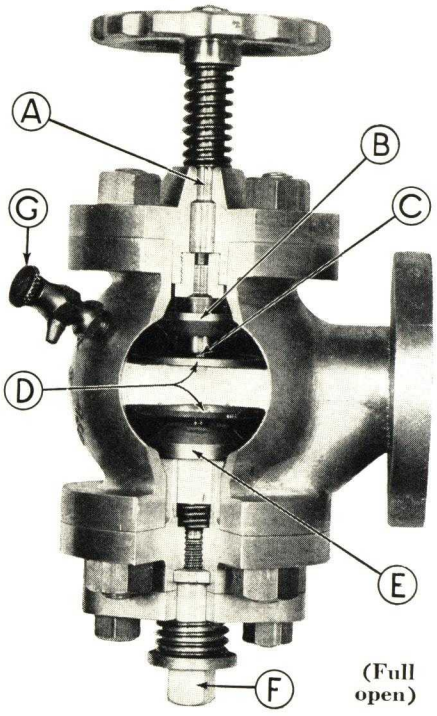
(Full open)

MAXWELL VALVES
are built to order
in
Globe or Angle Patterns
for any
Pressure or Temperature

◆

A Custom-built Valve
to suit
YOUR Operating Conditions
at a price comparable
with that of a
Stock Valve

Cut-away working models are available with which we will be glad to demonstrate the superior features of Maxwell Valves. No obligation.



(Full open)

SINGLE STEM VALVE
For Low Pressures

Construction Features—(A) Operating Spindle, (B) Conical member on top of the upper disc which seals the gland when the valve is open . . . this feature eliminates packing, (C) Upper Valve Disc, (D) Valve Seats, (E) Lower Valve Disc, (F) Locking Device for Lower Valve.

Operation—The valve is closed when both discs are in their seats.

To Open—The operating spindle is turned in the usual way. The first few revolutions raise the upper valve from its seat (while the lower valve remains closed) until it reaches the limit of its travel and seals the gland at (B). When the gland is sealed, subsequent turns of the spindle open the lower valve and admit pressure.

To Close—When closing, the upper valve does not start its downward travel until the lower valve is tightly seated . . . thus the seal at the gland (B) is not broken until pressure is entirely shut off.

Should the spindle become damaged, a few turns of the Locking Device (F) securely locks the lower valve in closed position permitting the removal of the cover, spindle and upper valve for repair or replacement *without shutting down pressure.*

DOUBLE STEM VALVE
For High Pressures

Construction Features—(A) Top Stem with Continuous Seal, (B) Upper Valve Disc, (C) Lower Stem which engages the Valve Discs, (D) Removable Valve Seats with nut on the bottom to prevent seat from raising under pressure, (E) Lower Valve Disc, (F) Locking Device, (G) Drain Cock to relieve pressure before removing cover.

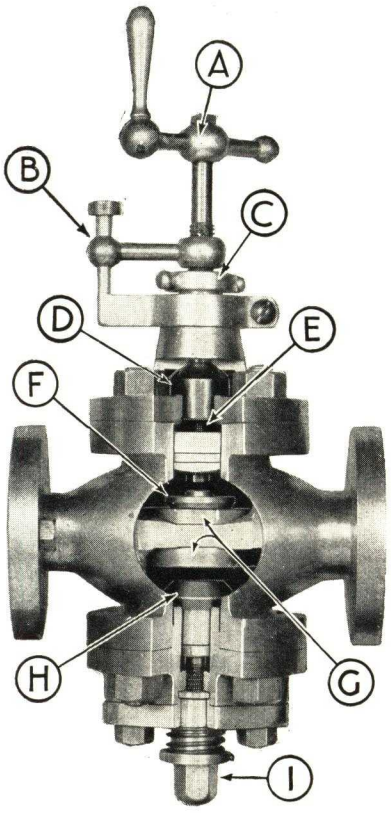
Operation—In principle and operation this valve is similar to the Single Stem type shown at the left. It differs somewhat in design, however, since it is essential in high pressure service to maintain a continuous seal at the gland (A). This is accomplished by constructing the Operating Spindle in two parts.

The upper part of the spindle is non-rising and is of one-piece construction with the gland seal, the latter being held firmly in place against the cover plate by means of the heavy phosphor bronze spring. The valve discs are operated by a secondary stem which is recessed into the upper part of the spindle.

In the operation of the Double Stem Valve, as in the case of the Single Stem type, the lower valve does not open until the upper valve has reached the limit of its travel. At this point the top of the disc forms an *additional* seal at the gland. It will be observed. therefore, that before pressure is admitted the gland is *double-sealed.*

MAXWELL VALVES CAN BE FURNISHED IN ANY SIZE AND FOR ANY PRESSURE

NON-RETURN VALVE



Maxwell Non-Return Valve

Maxwell Non-Return Valves are furnished for all working steam pressures. Sturdy construction throughout; the Tell-tale Indicator (B) which informs the operator at a glance the exact amount of the valve opening; and the inherent advantages of Maxwell double-disc design are the features which recommend this valve to the discriminating buyer.

Construction Details—(A) Socket Stem with Adjusting Handle for *setting* the lift of the valve. (B) Tell-tale Indicator *showing* the lift of the valve. (C) Stem Lock Nut to prevent movement of the stem during operation. (D) Gland Seal which eliminates packing. (E) Adjusting Screw for governing the lift of the valve. This small unit is easily replaced and renewable at small cost. (F) Check Valve. (G) Removable Valve Seats with nut on the bottom to prevent the seat from raising under pressure. (H) Emergency Valve. When this valve is closed repairs may be made to the upper units of the valve or to the equipment in the line behind the valve *without shutting down pressure*. The lower face of this valve disc forms a seal when not in use. (I) Operating Spindle for the lower (emergency) valve.

SALINOMETER GAUGE or TRY COCK

No Packing (Patented) Self-Grinding

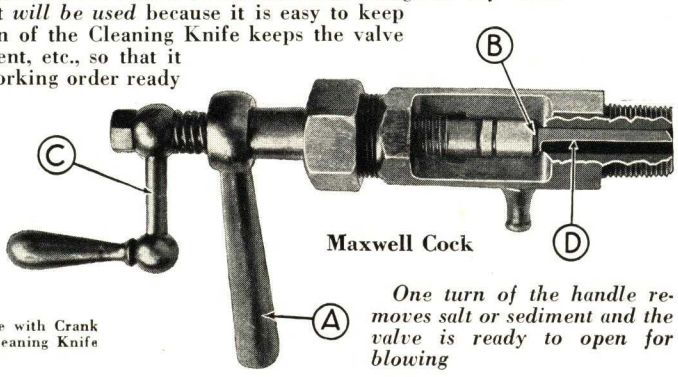
Protect your engineering personnel with this foolproof indestructible valve. It is indispensable on high pressure steam boilers as a Salinometer Gauge or Try Cock.

Here is a valve that *will be used* because it is easy to keep it clean. A daily turn of the Cleaning Knife keeps the valve free from salt, sediment, etc., so that it is *always* in perfect working order ready for instant blowing.

The valve body is of heavy rolled bronze. The spindle, valve and cleaning knife are of stainless steel.

(A) Bronze Operating Lever which opens and closes the Valve (B)

(C) Stainless Steel Spindle with Crank Handle for revolving the Cleaning Knife (D)



Maxwell Cock

One turn of the handle removes salt or sediment and the valve is ready to open for blowing

GLAND SEAL FOR ROTARY PUMPS

(A) Represents any impeller shaft.

(B) Bushing to fill the stuffing box of the pump. (Drive fits on outside diameter).

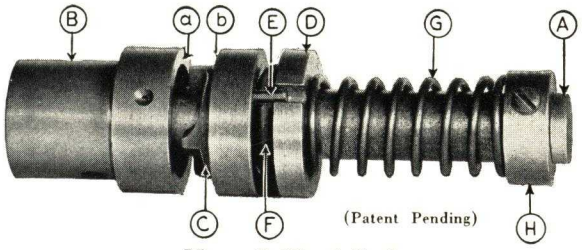
(C) Repeller. The face of the bushing (a) seals against face of the Repeller bushing (b) and forces the water back into the pump.*

(D) Driving Ring.

(E) Driving Pin.

(F) Rubber Washer to seal the shaft when the pump is stopped.

**[Prevents Leakage (Packing Does Not)
Stops Wear and Scoring of Bushing
Eliminates Friction—Increases Output]**



Maxwell Gland Seal

(G) Compression and Driving Spring.

(H) Adjusting Nut for regulating the tension to suit pump pressure.

*In the illustration at the left the Repeller (C) is withdrawn from the bushing (B) for pictorial purposes. In operation the bushing faces (a) and (b) are in contact and the Repeller (C) revolves with the shaft inside the bushing (B).

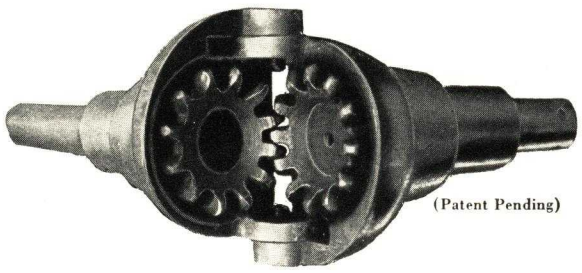
UNIVERSAL BEVEL GEAR

A properly guarded bevel gear assembly capable of smoothly transmitting a torque at any angle from a straight line to 135° angle in any direction.

The assembly is simple and is furnished in the form of a universal joint, it being necessary only to taper-pin the gear hubs to the driver and driven shafts.

This type of universal joint is preferred for quick assembly of reach rods and extension shafts to remote valves in ships, power plants, oil refineries, etc. It is rugged and will not freeze or corrode under outside weather conditions. Unless the operation is continuous, it requires no oiling.

The maximum angle of transmission being as great as 135° it affords great flexibility where universal joints are required. The efficiency of transmission is about 95% at all angles and its installation is recommended where a minimum number of joints is desired—one Universal Bevel Gear replacing two or perhaps three universal joints having restricted transmission angles.



(Patent Pending)

WORKING MODELS OF THIS EQUIPMENT DEMONSTRATED WITHOUT OBLIGATION

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INSTRUMENT SERVICE

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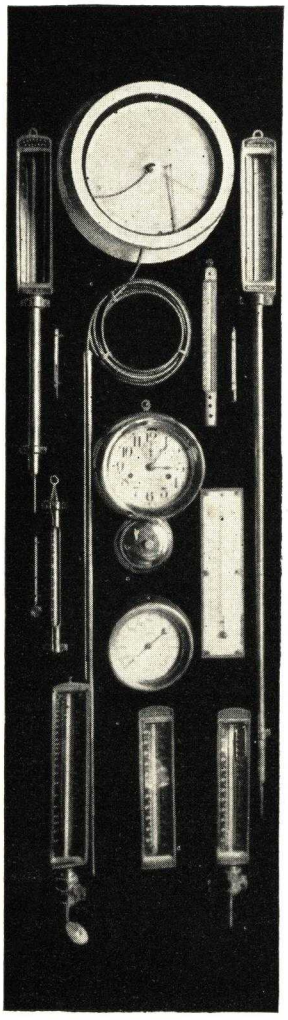

We rebuild, repair, overhaul, calibrate, alter scales and ranges on practically all makes and types of Industrial, Marine, Boiler Room and Power House instruments.

This service is unique . . . *it is a specialized service* developed to the point where it is now serving Industrial, Marine, Oil Refinery and Utility fields alike in a way that has never before been attempted.

Owned and organized by the CONDENSER SERVICE & ENGINEERING CO., INC., the keynote of the organization is fast, accurate and dependable service. We have a fully equipped shop, supervised by competent engineers. A high standard of quality is attained through rigorous inspection. These facilities enable us to offer you advantages in the maintenance of your instruments which we believe are unsurpassed.

Estimates furnished promptly and without obligation.

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All your instruments are handled by *one* responsible organization.

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We will return instruments with the utmost promptness. A recording thermometer, for example, in two weeks. Less time in emergencies.

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We call for and deliver in the Metropolitan Area of New York.

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We work 24 hours a day . . . 7 days a week when required in emergencies. We have repaired gauges and thermometers in two hours.

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Recorders
All makes and styles

Thermometers
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Electrical Meters
Ammeters, Voltmeters, Wattmeters, Pyrometers, Potentiometers

Barometers

Thermostats

Hygrometers

Mixing Valves
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Control Valves
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All Repair Work Carries a New Instrument Guarantee

Our ability to render dependable, satisfactory service is demonstrated by the fact that

Railroads
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are among our customers.

INDUSTRIAL THERMOMETERS

We manufacture all types of Industrial Thermometers. Standard ranges carried in stock for immediate delivery at unusually attractive prices. These instruments are guaranteed as to accuracy and quality of workmanship. Only the finest materials are used in their manufacture and the highest available type of experienced labor is employed.

No matter what kind of a thermometer you need . . . *we can supply it promptly.*

We Will Build Special Instruments to Suit Your Needs

We Have Many Rebuilt Instruments in Stock

SAVE MONEY AND TIME BY USING THIS RELIABLE INSTRUMENT REPAIR SERVICE

THE BLACKBURN-SMITH MFG. CO., INC.
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Blackburn-Smith
FILTERS, STRAINERS and SEWAGE EJECTORS

Efficient — **Reliable** — **Economical**

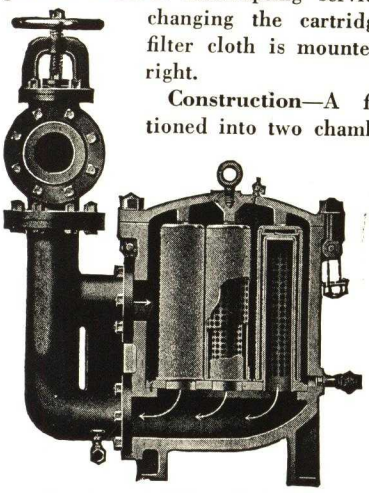
FEED WATER FILTER AND GREASE EXTRACTOR

The Filter with Long Life . . . It Has No Moving Parts

Removes oil and grease from water, removes impurities from boiler make-up water, saves coal and water, effects more efficient heat transmission in boilers.

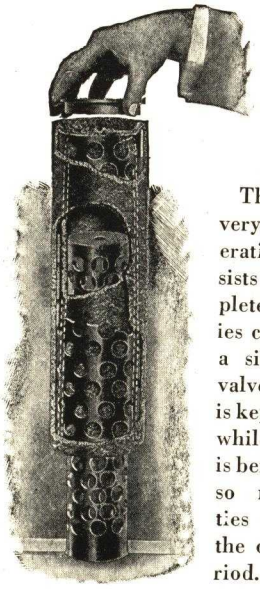
Effective for removing dirt, clay, sediment and mechanically suspended particles from water supplied for industrial processes, swimming pools and drinking water systems.

Cleaning requires only a few minutes and is accomplished without interrupting service. It consists of changing the cartridges on which the filter cloth is mounted as shown at the right.



Section of Filter Body

Construction—A filter body, partitioned into two chambers, causes the filtration of all water through a number of small easily handled cartridges, consisting of two concentric perforated brass cylinders covered with terry cloth.

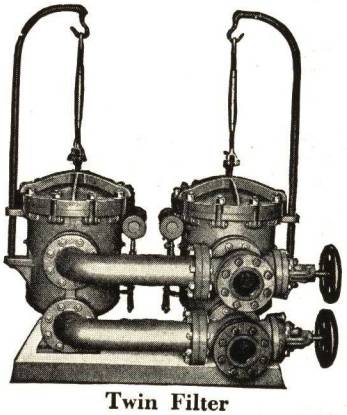


This provides double filtration through separated surfaces of an impregnated filter cloth made exclusively for this filter.

The upkeep expense and labor are reduced to a minimum, as the filtering media are used over and over again, and as there is no other part to deteriorate or reduce the filtering efficiency.

Available in single body and twin types in a wide range of capacities.

The twin unit at the right is for the filtration of very dirty raw water, or of condensation in plants operating continuously or with heavy peak loads. It consists of two complete filter bodies controlled by a single set of valves. One side is kept in service while the other is being cleaned, so no impurities pass during the cleaning period.

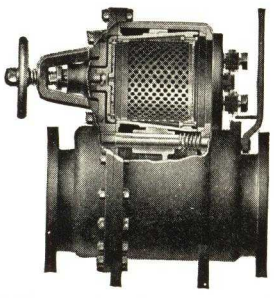


Twin Filter

We Furnish Filter Stockings for All Types of Filters

MULTI-DUCT STRAINER

For removing solid matter from water, oil and other liquids. Used for general supply and power plant purposes. Special wire cloth linings adapt it to special services on dyes, brine, swimming pool water, etc. Can be cleaned without interruption of service. Large straining area results in long operation before cleaning is necessary. Small space required. Can be mounted in any position. *Baskets cannot spill contents.* Internal parts made of bronze for long wear.



Strainer Basket in Position for Removal and Cleaning

Construction and Operation—Consists of three or more cylindrical strainer baskets securely held in bell-shaped conduits, spaced in a cylindrical plate and secured in a frame keyed to a central shaft. *Two baskets are continuously in service while the third is in cleaning position.* Baskets are rotated by moving a lever one-third turn, fixed by a stop, to bring the fouled baskets successively into position for cleaning. One turn of the hand wheel closes the valve disc against one end of the conduit, forcing the conduit to seat and completely shutting off each basket as it is to be cleaned. The cover is opened and the basket removed by a rod and plate device, which prevents the basket from spilling. This plate, when not in use, is secured against the face of the valve disc.

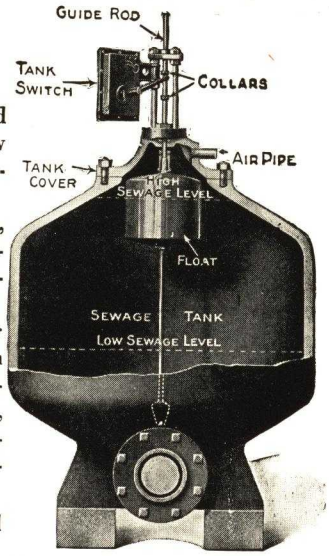
PNEUMATIC SEWAGE EJECTOR

For raising, by compressed air electrically controlled, raw sewage, sludge and liquids bearing solids.

Simple and rugged, insuring, in both design and construction, successful operation without maintenance trouble.

The control of the injector makes possible the installation of either a reciprocating compressor with air receiving tank, a directly-connected rotary compressor or other already available compressed air supply.

Furnished in all capacities and for all lifts.



Sectional View of Collecting Tank

◆ **Individual Bulletins Furnished on Request** ◆

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